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IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF OREGON

PENDLETON DIVISION

WESTERN WATERSHEDS PROJECT, CENTER FOR BIOLOGICAL DIVERSITY, and **WILDEARTH GUARDIANS,**

Plaintiffs,

v.

DAVID BERNHARDT, Secretary of the Interior, **JEFFREY A. ROSE,** District Manager, Burns District Bureau of Land Management, and **BUREAU OF LAND MANAGEMENT,**

Defendants.

Case No. 2:19-CV-750-SU

SECOND DECLARATION OF J. BOONE KAUFFMAN

I, J. BOONE KAUFFMAN, Ph.D., declare and state as follows:

1. My name is J. Boone Kauffman. I am the same J. Boone Kauffman who previously submitted a declaration in this case. I submit this Second Declaration in further support of Plaintiff's Motion for Temporary Restraining Order/Preliminary Injunction, ECF No. 7. This Declaration expands upon and incorporates by reference the facts to which I attested in my previous Declaration, ECF No. 9.

2. As I previously mentioned, I have over 43 years' experience working in Rangeland ecology and management. I have a BS in Range Management (Texas Tech), a MS in Rangeland resources (Oregon State University, riparian ecology) and a PhD in Fire ecology (UC Berkeley). Throughout my professional life, my research has focused on the dynamics of natural ecosystems, land use (such as grazing) and disturbances such as fire. At the university level, I have taught principles of range and wildlife management, fire science, riparian ecology, restoration ecology and global change biology. I have conducted range condition and trend analyses both as a range technician and as a research professor. I also am an Eagle Scout and won the 1978 Society for Range Management international range plant identification contest. The statements below are based my scientific training, research results in the region, personal knowledge, and experiences with range condition and trend that encompass my 43 years of professional experience researching and studying fire ecology, riparian ecology, range management, and how livestock influence rangeland ecosystems.

3. This declaration is also based on my first-hand observation of several areas within the Hardie Summer, Mud Creek, and Frazier Field allotments. Specifically, on June 19 to 21, 2019 I visited sites on Steens Mountains to observe and document current ecological conditions

there that inform my professional opinion of the likely impacts to upland and riparian habitat and species from grazing in 2019, if it occurs.

4. This declaration is also based upon my review of the Declarations of Matthew Obradovich, Jamie McCormack, Lindsay Davies, and Dale A. McCullough, PhD, and the summary of expected testimony from Tamzen Stringham. I have attached some of the key scientific papers, or excerpts of them, to this Declaration.

5. In consideration of my recent site visits, I reaffirm that the statements I made previously in my first declaration are both factually and scientifically accurate, except that I underestimated the degree of degradation and poor ecological condition of the Mud Creek Allotment.

6. Livestock grazing is the principal cause of ecosystem degradation and continued grazing will only exacerbate ecosystem degradation.

7. **The current condition of the allotments is reflective of a century of livestock grazing on the landscape.** The invasive and exotic species present (e.g., cheatgrass, medusa head), juniper expansion, riparian and channel degradation, aspen decline, and fire effects and postfire responses all arise from livestock grazing. The allotments have lost their resilience to recover following wildfire. Continued livestock grazing will continue the degradation occurring on the sites. Grazing benefits to the few are far outweighed by the negative impacts to the public's ecosystems services by the irreparable harm created by continued livestock grazing on these allotments. There is no ecological or public benefit. The interaction among primary, secondary, and tertiary influences of grazing on sagebrush and riparian landscapes is summarized in Figure 1:

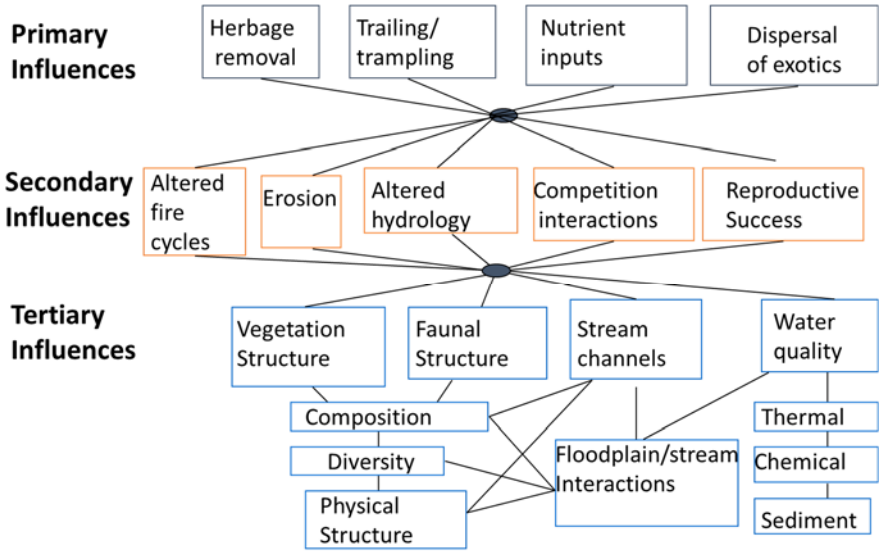

Figure 1. Livestock influences on sagebrush/riparian landscapes. Primary influences are the real time effects of livestock on ecosystems. The secondary effects are the responses and results of the interactions of livestock over time and the tertiary influences are the ultimate effects of livestock on the environment. In the case of the Mud Creek and Hardie Summer allotments the tertiary influences include drastic alterations in vegetation composition and structure, loss of wildlife diversity, altered fire regimes, degraded stream channels and negative effects on water quality. Figure is from Dwire et al. (1999).

8. The impacts of long-term livestock grazing on western landscapes are widespread and profound, as indicated by various synthesis studies of the topic. For example, Platts (1991) concluded that livestock grazing practices have caused streamside environments to deteriorate over time and have been effective at altering all components of an aquatic system (i.e., riparian vegetation, stream banks, channel morphology, and water quality). Belsky et al. (1994) indicated that livestock grazing "has damaged approximately 80% of stream and riparian ecosystems in the western United States" because livestock seek out water, succulent forage, and shade in riparian areas. In turn, this leads to trampling and overgrazing of streambanks, bank erosion and loss of streambank stability, and reduced water quality (more sediment, higher temperatures). Across uplands, the direct and indirect effects of livestock grazing contribute to simplified plant communities which, combined with the loss of vegetation mosaics across landscapes, affects pollinators, birds, small mammals, amphibians, wild ungulates, and other native wildlife

(Fleischner 1994, Ohmart 1996). Livestock grazing has altered the fire regimes and the natural vegetation responses to fire.

9. Because grazing in arid land environments can cause irreversible damage to plant communities and wildlife habitat, Donahue (1999) indicated that a landscape scale strategy is required to conserve the native biodiversity of western rangelands, a strategy that focuses on the need to remove livestock from large tracts of public lands. Beschta et al. (2013) and Kauffman et al (2003) concluded that historical and contemporary alterations to vegetation, soils, hydrology, and wildlife species composition and abundance from livestock grazing often "exacerbate the effects of climate change." Overall, there is a rich literature documenting the trophic downgrading of rangeland ecosystems from long-term livestock grazing. Furthermore, this literature is consistent with the need to significantly reduce or entirely remove the effects of livestock grazing in order to recover lost biodiversity and ecological functions associated with upland (Donahue 1999) and riparian communities (Kauffman et al. 1995).

Red band Trout Habitat Needs

10. I have reviewed of the Declaration of Dale A. McCullough and the literature he cites attesting to the biological and habitat needs of red band trout, which accords with my own understanding—based on the science—of the species' needs to survive. There is a body of literature on the influences of livestock on riparian/stream ecosystems in the American West that is directly relevant to the importance of riparian vegetation to red band trout and their vulnerability to environmental change due to grazing and climate change. I am quite familiar with this science behind such articles cited by McCullough such as Belsky et al (1994), Zoelich and Cade (2006) Ebersole et al. (2001), Li et al, (1994) etc. and the conclusions they reach about grazing impacts to riparian areas and effects of increased temperature and sedimentation

on red band trout. In addition, I have contributed to this literature examining livestock influences on streambanks (Kauffman et al 1984), vegetation (Kauffman et al 1984; Brookshire et al 2003, and many others), soil properties (Kauffman et al 2003) and fish populations (Kauffman et al 2003). The research results of these studies are also congruous with the conclusions of McCullough and are directly relevant to the Allotments here.

11. In particular, I am aware that red band trout spawn in spring, remain in place until migrating to overwintering areas in fall, and are very sensitive to stream temperature—especially stream temperatures above 28ºC. Red band trout require overhanging streambanks for cover, clean gravels for spawning, deep flowing waters for hiding, and shading from riparian vegetation to maintain cool temperatures. Grazing in these allotments will most likely decrease habitat quality for red band. This includes loss of overstory cover affecting stream temperature and food sources, loss of habitat structure due to channel and streambank trampling and increases in sediments. Grazing will likely exacerbate temperature exceedances due to overstory removal directly decreasing red band trout abundance. Overstory removal will decrease allochthonous inputs and thus food quality for trout. Further bank trampling of the low gradient reaches is likely to affect spawning quality as well as juvenile hiding cover.

12. As I explained in my previous Declaration, and explain in more detail below, grazing on the Hardie Summer allotment in particular, will likely damage all of these key habitat components, reducing value of riparian habitat on the allotment for red band trout and decreasing likelihood of their survival.

Riparian Conditions on the Mud Creek and Hardie Summer Allotments

13. On June 20, I visited Big Fir Creek on the southwestern portion of the Hardie Summer allotment, close to the CM Otley FFR allotment. We also visited reaches of Dry Creek

in the Mud Creek Allotment on this date. On June 21 we visited several reaches of the Mud Creek from its headwaters to its mouth.

14. The Riparian zones of the Mud Creek and Hardie Summer allotments are of great importance for fish and wildlife. Over 80% of the fish and wildlife species are dependent upon riparian stream ecosystems (Kauffman et al. 2000). Their sustainable management is critical for the perpetuation of the ecosystem services provided to the American public.

15. On the Hardie Summer allotment, the riparian vegetation and channel conditions are showing signs of recovery. Willows are re-growing and beginning to regain their natural shape rather than a high browse line from grazing. I was concerned that there are few willow seedlings establishing where they naturally establish (i.e. on point bars which are sites associated with the creeks and channel edges that are close to the water table where willow seedlings most commonly establish). This lack of seedling establishment may be due to the effects of current big game browsing and trampling. Willows are of great ecological importance for riparian obligate species as well as red band trout: (1) they are exceptionally palatable forage species for big game; (2) they are a nesting and insect source for dozens of species of song birds; (3) they provide bank stability and overhanging hiding cover for fishes; (4) they are the source of nutrient and insect inputs critical for trout survival; and (5) they provide shade necessary to maintain the cold water conditions required by red band trout.

16. The BLM declarations of McCormack, Obradovich, Davies, and the summary of the likely testimony of Stringham fail to recognize the vulnerable nature of willows. Their testimony ignore the fact that willows are very palatable to cattle especially later in the grazing season. Grazing during the end of the summer as proposed would result in irreparable harm to the willow/shrub component. At this time of year, the uplands are beginning to dry out thus

increasing the desire for cattle to stay in the cooler, greener riparian zones (Elmore and Kauffman 2000). This means that utilization and trampling damage will be especially high in the riparian zones and streams of the Hardie Summer allotment. The effects of five years' rest could be wiped out in one grazing season. Further, it is a well-known fact that cattle spend a disproportionate amount of time in the riparian zones (Roath and Krueger 2002). As such, the majority of feces deposited by cattle will be near or within the riparian zone and this can affect water quality. The allotted number of animals (1,500 AUMs) will conservatively produce 2,475,000 lbs of manure each year while on the allotment. This huge influx of animal feces will likely affect water quality.

17. The streambanks of the Big Fir Creek are revegetating and some overhanging banks are developing. The channels are narrowing and channel diversity is incrementally increasing. This is a relatively low sediment site, so recovery will be slow. Some big game use and trampling is apparent at this site. The addition of livestock would greatly accelerate trampling damage of this stream banks in the low gradient reaches. These are sites that have just shown signs of recovery due to the long period of rest but still require more rest in order to recover and provide optimal conditions for red band trout. Spawning habitat (Redds) is in the low gradient sections most susceptible to grazing/trampling damage. Cover and conditions for embryos/fry would be harmed with the trampling of streambanks and loss of cover.

18. Contrary to testimony to be presented by Stringham, the fine roots of the grasses, sedges and forbs are quite important for streambank stability and riparian function. Grazing will affect this important function of riparian vegetation. For example, Kauffman et al. (2004) reported profound differences in the belowground properties of grazed and ungrazed riparian meadows such as in Figure 2. The root mass was 62% greater in ungrazed riparian streambanks

compared to grazed sites (2857 and 1761 g/m^2, respectively). Soil bulk density was significantly lower, and soil pore space was higher in ungrazed sites thus affecting erosion and water quality. The mean infiltration rate in exclosures was 233% greater on ungrazed sites (80 vs 24 cm/h). In ungrazed sites, the rate of net potential nitrification was 149-fold greater (0.747 vs. 0.005 µg NO_3-N·[g soil]$^{-1}$·d^{-1}), and the rate of net potential mineralization was 32-fold greater (0.886 vs. 0.027 µg N·[g soil]$^{-1}$·d^{-1}, respectively) when compared to grazed sites (indicator of properly functioning conditions). In other words, nutrient cycling processes were much more rapid making more nutrients available for growth in ungrazed sites. Livestock removal was found to be an effective approach to ecological restoration, resulting in significant improvements in soil, hydrological, and vegetation properties that, at landscape scales, would likely have great effects on stream channel structure, water quality, and the aquatic biota.

19. The photographs below accurately represent the conditions I observed at those locations at the time the photographs were taken, except for the photographs on page 12 below which are related to the Batchelor et al. 2015 study of the restoration of riparian areas following the removal of cattle, and are included for illustration purposes.

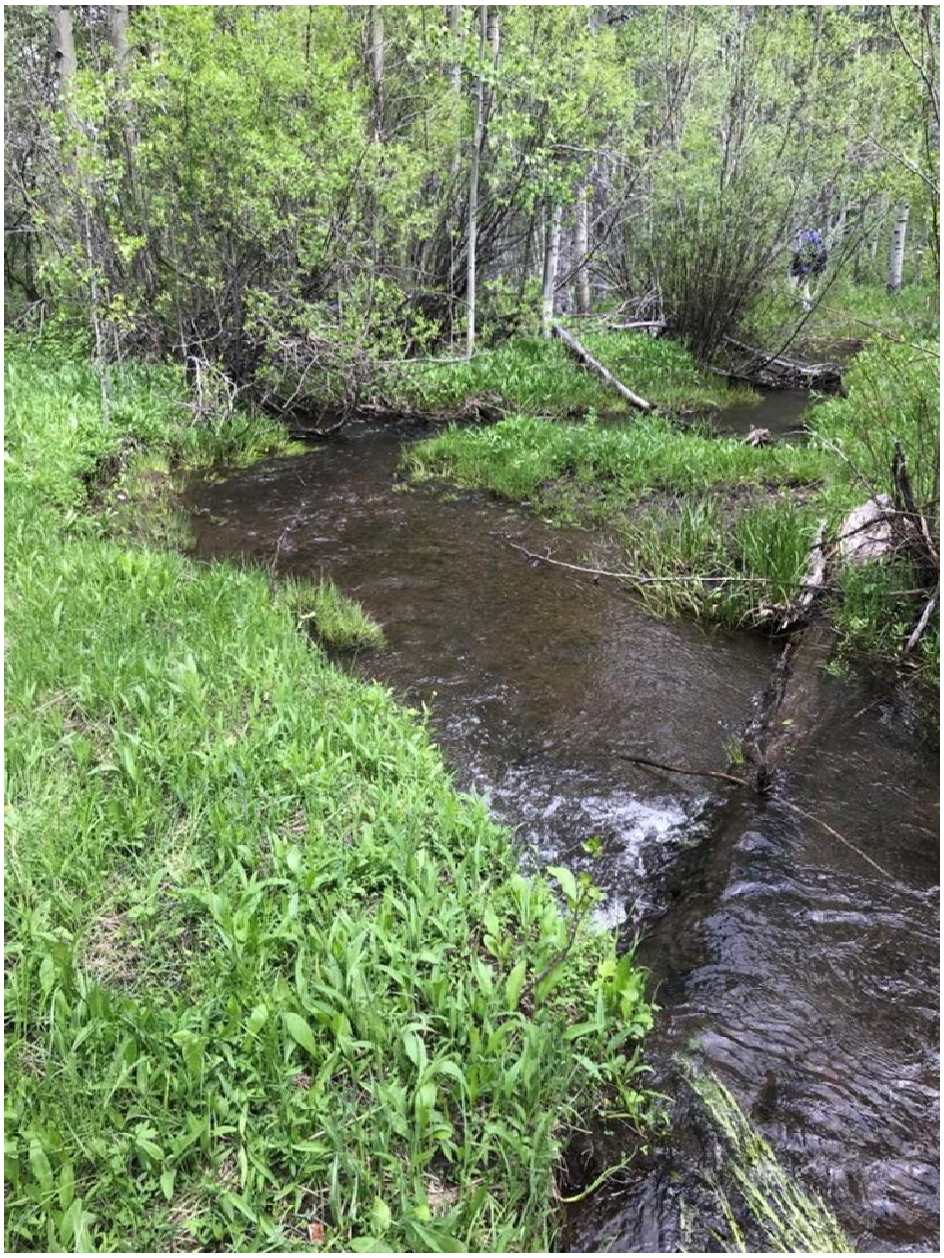

Figure 2. A recovering reach of Big Fir Creek (June 20, 2019). The herbaceous component in the foreground is quite important for streambank structure and erosion control. These sites are vulnerable to livestock grazing and trampling damage to the detriment of other resource values. Some trampling damage by big game is occurring but streambank stabilization and improved riparian conditions are apparent. Willows (in the background) are very palatable species to cattle as well as critical components of fish habitat and their recovery is also vulnerable to grazing by cattle at this time. These multiple disturbances by cattle would degrade the habitat for red band trout.

Figure 3. Photo of Dry Creek on the Mud Creek allotment (June 20, 2019). The stream was running at this time. The slowly recovering riparian ecosystem is the small greenline associated with the degraded channel. Extensive livestock trailing damage is apparent on the opposite bank. Intermittent streams such as this encompass a large percentage of stream miles [including the Mud Creek and Hardie Summer allotments] and have cumulative impacts on the water quality and biodiversity of the public lands. Similar to the uplands of this allotment, recovery public values can only come from decades of rest following a century of livestock use. It is possible this creek could be perennial if the upland watershed conditions were not so degraded.

20. We observed riparian conditions in an around the Mud Creek allotment on June 20 and 21, 2019. Riparian conditions in and near the Mud Creek allotment range from intact along the protected Mud Creek to severely degraded on Dry Creek (Figure 3). We examined several sites of Mud Creek from its headwaters to its mouth below the allotment. Mud Creek is protected by steep rimrock and there are few places that cattle have access. As a result, the

ecological condition of Mud Creek is quite high with a diverse mix of willows and the presence of beaver. Care must be taken to protect this important resource.

21. Dry Creek is an unprotected and severely overgrazed riparian/stream ecosystem in the Mud Creek allotment (Figure 3). While rest has allowed some recovery the evidence of recent overgrazing is still apparent. Under the current degraded conditions of the allotment, this is an intermittent stream. However, with long-term rest a functioning riparian ecosystem is possible to attain. Returning livestock to this site would reverse all gains made towards recovery of this riparian ecosystem and reduce its value for riparian-dependent wildlife and as potential red band trout habitat. The potential for recovery of riparian/stream ecosystems such as this all the other headwater intermittent and perennial streams can be evidenced by examining the recovery of similar streams where livestock have been removed (see figures on next page). About 0.4 miles of Bridge Creek is within the Mud Creek Allotment. We did not have an opportunity to observe this site but, if accessible to cattle, it is likely utilized in a manner similar to that of Dry Creek. As such it would be a significant source of sediment, and fecal coliform affecting water quality. Functions of the important riparian zone would not exist under the proposed grazing plan. Where livestock can access Bridge Creek and Mud Creek, water gaps were installed in the 1980s. These would in effect be sacrifice areas and additional sources of sediments, fecal coliforms and degraded riparian habitat.

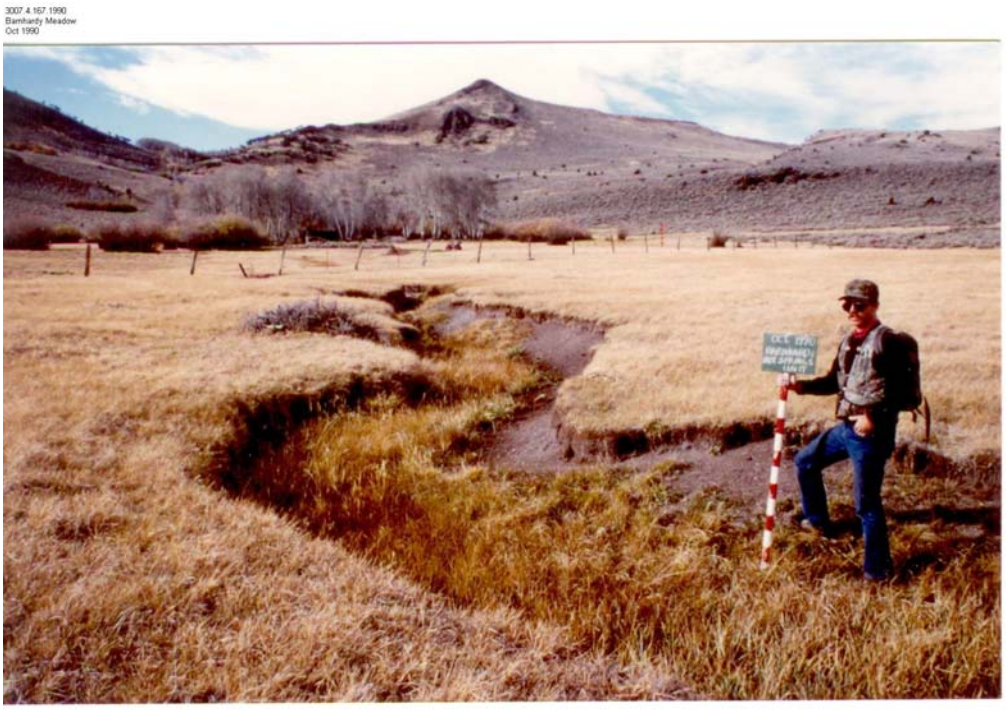

Fig 4a. Before - This is an example of an over-grazed ("non-functioning") creek at the Hart Mountain National Antelope Refuge in 1990. This is similar to current conditions in Dry Creek in the Mud Creek allotment. Barhardy meadows, Hart Mountain, 1990. See photo below for the paired comparison after 20 years rest. Notice the complete absence of willows at this time.

Fig 4b. After - This is a re-take of the photo of a recovering intermittent stream after 20 years rest from livestock grazing. This demonstrates the potential to restore these important ecosystems such as Dry Creek and all of the intermittent and perennial streams of the Allotments. This is what a "properly functioning" stream looks like.

The Assessment and Evaluations conducted by the BLM do not provide a scientific justification for return of grazing

22. Monitoring of the condition and trend of the ecological condition of the allotments has been wholly inadequate to determine how land management is affecting the public's natural resources. According to the BLM summary sheets over the last 20–30 years the BLM has only conducted qualitative observational reviews of upland and riparian trend. In other words, there is no definitive data that supports claims of sustainable management of the allotments. The degraded composition and structure of the Mud Creek allotment, suggests no long-term improvement in ecological condition.

23. A BLM Interdisciplinary Team (IDT) completed a Standards and Guidelines Assessment and Evaluation for the allotments in 2018. The Assessment and Evaluation is purely observational. No data were actually collected that could facilitate an accurate determination of the vulnerability of this site to harm. The Evaluation sheets were not even completely filled out. Further, the size of the evaluation for the Mud Creek allotment was 3 acres. This means they base decisions affecting the structure, function and diversity of land for current and future generations of Americans based upon casual observations on 0.00036% of the land. There were two Assessments, covering about 3 acres each, for the 6,008 acres of public land for the Hardie Summer Allotment. This means that about 0.001% of the land was examined in these assessments and evaluations. This is a wholly inadequate assessment of the allotment given the diversity of ecological sites, the diversity in ecological condition and the resource values of this allotment. Accurate evaluations of management success and needs cannot be gained from this level of assessment.

24. A Standards and Guidelines Assessment and Evaluation for the Mud Creek and Hardie Summer Allotments was completed with Dr. Robert L. Beschta (hydrologist and trophic

cascdes specialist) and myself on June 21-22, 2019. Our evaluations share the same shortcomings as that of the BLM assessments except that we included observations of a much broader area that included both the uplands and the riparian zones that we observed. We found that standards were not being achieved on the Mud Creek Allotment. While being achieved in the Hardie Summer Allotment following 5 years of rest, our professional judgement concluded that any of the standards were at risk if grazing is resumed on the allotment.

Table 1. An independent review of Range Health Assessments, Evaluation and Determinations for the Mud Creek and Hardie Summer Allotments; June 2019 conducted by JB Kauffman and RL Beschta.		
	Mud Creek Allotment	**Hardie Summer Allotment**
	2019	**2019**
Standard 1 – Watershed Function upland	**Not Achieved**; lack of shrubs, native grasses and forbs affect hydrological, nutrient and carbon cycling; degraded composition of upland plant communities consisting largely of unpalatable exotic perennial and annual grasses that severely limit functional integrity of this allotment; Upland sites reflect the long-term impacts of livestock grazing and the seeding of crested wheat grass, resulting in the loss of the inherent resilience of this site and culminating with the deleterious effects of the wildlife Causal Factor - synergistic effects of livestock grazing and rangeland treatments (herbicides to remove sagebrush and planting of exotic grasses).	**Achieved** – good cover and intact native composition of upland communities following rest **-**
Standard 2 Watershed Function, Riparian	**Not Achieved**: Dry Creek, an intermittent stream but containing a heavily degraded riparian zone due to livestock overgrazing and trampling. There have been no management actions for its conservation or improvement. Causal Factor – Ovegrazing and trampling damage by cattle.	**Achieved (Functional–at risk) –** Much of stream channel controlled by boulders and mature willows, however low gradient reaches have experienced trampling damage from livestock and continue to be vulnerable to those impacts. Riparian vegetation especially sedges and grasses along these low gradient reaches would be subject to heavy grazing and trampling by cattle. Rest from grazing has facilitated the beginning of natural recovery of the site; the return to grazing would reverse these improvements.
Standard 3- Ecological Processes	**Not Achieved** – loss of native vegetation suggests loss of processes critical for providing ecosystem services that would be derived from properly functioning ecosystems – successional process, hydrological processes, nutrient cycling are severely altered - causal factor – overgrazing and secondary responses.	**Achieved (Functional–at risk) -** but low gradient reaches are vulnerable to trampling damage. Willows would be subject to heavy use by the grazing period proposed. Rest has facilitated natural recovery of the site.; grazing would reverse this.
Standard 4 – Water Quality	**Not Achieved** – Dry creek is a severely degraded intermittent stream with an absence of cover from riparian plants and a loss of channel structure; Cattle in the intermittent	**Achieved (Functional–at risk)** – Long-term bank erosion apparent in low gradient segments due to streambank

	streams contribute to increased sediment loads and fecal coliforms during periods of streamflow. causal factor – the long-term effects of livestock grazing, trampling and trailing damage.	trampling by cattle; continued livestock use will greatly exacerbate these impacts.
Standard 5 Native and special status species	**Not Achieved -** Widespread loss of native shrubs, herbs and grass species resulting in a highly degraded wildlife habitat: Causal Factor - A century of poor livestock management that has severely degraded this site, including the herbicide treatment of sagebrush, seeding with the exotic crested wheatgrass, overgrazing, and a high intensity fire (due to arson).	**Achieved (Functional–at risk)** – Redband trout habitat along low-gradient portions of stream would be vulnerable to grazing due to loss of shrub (willow cover), trampling of banks, increases in sediments, loss of spawning habitat, etc. Willows are also keystone species for wildlife (especially birds) and are these services are vulnerable to loss by grazing.
Summary	**The upland composition and structure of plant communities in this allotment are in a severely degraded state, both in terms of physical as well as biotic indicators. Any resumption of livestock grazing will continue to irreparably damage this allotment; dramatic restoration approaches including total cessation of grazing are necessary to recover natural processes, functions and biological diversity – this will require >50 years of natural recovery. Failure to implement restoration now will result in irreparable damage. There are many riparian areas in a degraded state and vulnerable to continued degradation.**	**The high elevation resulting in higher precipitation provides a greater natural resilience of this allotment. Rest from livestock has provided time for the willows and streambanks to begin recovery on this allotment. Resumption of grazing will undo restoration gains achieved to date and prevent further recovery.**

Cattle do not reduce fire risk but they alter natural fire patterns such that more severe fires occur as a result of livestock grazing.

25. Livestock grazing changes the natural fire regimes of sites. Fire regimes are defined as the regular pattern or occurrence of fire as manifested in the frequency, size and severity of the fire. Rather than relatively frequent low severity fires, the fires resulting from livestock are now are severe and result in greater ecological damage. The work cited in the

BLM declarations (Davies et al. 2006) overstates the effects of grazing because it fails to measure the entire fuel load – they missed the surface fuels (dead sage litter etc.) which are among the largest fuel components. Grasses are only about 4-5% of the total fuel load in sage ecosystems (see table below Reis et al. 2017) so they really have little effect in severe fire conditions where fire can carry through the sagebrush (such as what occurred as a result of the Grandad arson fire set on the Mud Creek Allotment in 2006). Livestock grazing may reduce fire occurrence in moderate weather conditions but under the hot, dry, and high wind conditions where large fires occur, they will have minimal effects.

Figure 5. Fire in a big sagebrush community on Prineville BLM lands near Bear Creek. Under these conditions fire carries though the canopies of the sagebrush.

Table 2. Summary of fuels as a percentage of total fuels. Downed woody debris (DWD), litter accumulated under shrubs (Shrub Litter), detached grasses and herbs (Grass Litter), standing dead grasses and herbs (Standing Dead), live grasses and herbs (Live), Total Herbaceous Fuels (Grass Litter, Standing Dead, and Live); and shrub biomass as a percentage of unburned control for Wyoming big sagebrush communities at HMNAR initially burned September 1997.

Fuels Category	Control (% of total)	Burn (% of total)	F-value	P-value
DWD	27.2±3.7	14.3±4.1	5.45	0.02
Shrub Litter	10.6±3.1	12.4±2.9	0.183	0.67
Grass Litter	0.5±.21	29.3±4.2	46.679	<0.01
Standing Dead	0.9±.26	15.4±2.2	41.134	<0.01
Live	0.2±.04	6.4±1.5	18.435	<0.01
Herbaceous Fuel	1.6±.045	51.1±5.9	70.119	<0.01
Total Understory	39.5±4.7	77.9±5.5	28.118	<0.01
Shrubs	60.5±4.7	22.1±5.5	28.118	<0.01

How do livestock affect fire regimes and fire effects?

26. Cattle have a profound effect on fire effects and this is apparent in the allotments that we visited on this trip. Grazing is likely to reduce the presence of bunchgrasses in the intershrub spaces. In grazed sagebrush ecosystems a higher proportion of the native bunchgrasses occur in the sagebrush understory where they are afforded some protection from grazing. However, when fire does occur, they are more susceptible to mortality because of the higher fuel loads under the sagebrush (see tables and Figure 5). As such, grazing results in a higher mortality of bunchgrasses and forbs due to fire in grazed compared to ungrazed sagebrush environments.

27. Grazing also has strong impacts on postfire environments when burned areas are grazed one to two years following wildfire as is the standard with the BLM. The immediate years following fire are the times in which native bunchgrasses and forbs naturally establish in the sagebrush ecosystem. In the first postfire years, we have documented fire-enhanced

reproduction of native grasses and forbs. Grazing in the first 5 postfire years will severely diminish this important fire/native vegetation establishment. This will facilitate occupation of exotic annuals and the loss of native vegetation. In effect, we are "mugging a burn victim."

Western Juniper expansion and the presence of Cheatgrass is the result of livestock grazing.

28. It is also clear that western juniper has greatly increased in the Steens including the visited allotments since the introduction of livestock. Miller (2005) has demonstrated that western juniper expansion coincided with Euro-American settlement and the introduction of livestock. But this time period also coincides with the forced removal of the indigenous populations (native peoples) from the land; cultures who utilized fire for a variety of positive land uses. The expansion of Western juniper at the expense of other important native communities is directly related to livestock grazing because it did reduce low severity fires that would limit juniper. Further grazing facilitated a competitive advantage to western juniper seedlings over the palatable bunchgrasses. As such it is important to recognize that juniper expansion is a direct response of livestock grazing. In Ms. McCormack's Second Declaration at ¶ 12, she also discusses the findings of the 2018 Land Health Assessments that failure to meet standards for special status species was due to juniper invasion, lack of sagebrush, and fire risk from annual grass infestation—not grazing. The failure to link these conditions to livestock grazing is at best a failure to understand basic rangeland ecology. In severe fire conditions, fires will carry though the sagebrush or juniper fuels.

29. The Second Declaration of Jamie McCormack at ¶ 18 and the Second Declaration of Matthew Obradovich at ¶ 12, suggest that livestock grazing on the allotments is important to prevent high-intensity wildfires. This is a failure to recognize or consider basic principles of grazing management. The cheatgrass is already dried up on these sites at the time of grazing.

In other words, it is in an unpalatable state for livestock. Similarly, the exotic crested wheatgrass is far less palatable than native bunchgrasses such as bluebunch wheatgeass and western needle grass. Grazing to reduce fire intensity would require substantial reduction in the mass of the exotic grasses. But to accomplish this would result in extreme overuse of the native grasses and forbs before cattle would begin to graze the less palatable exotic grasses. This overuse/overgrazing of the native species would be deleterious to other resource values such as sage grouse habitat. This would likely even result in loss in weight gain of the cattle.

30. The timing and intensity of grazing on these allotments will not diminish the intensity and spread of wildfire at during times of severe fire danger. For example, the high severity Grandad (arson) fire occurred on this site in August after the grazing season. Further, dried livestock feces are significant sources of spot- fires during wildlife. The presence of dried feces will increase fire spotting potential and therefore fire control and danger to fire fighters in the event of a wildfire.

31. Both McCormack and Obradovich declarations also suggested that livestock grazing will slow the spread of cheatgrass. There is no scientific basis for these statements. Rather the disturbance created by cattle trampling and the diminished vigor of native species due to grazing will confer a competitive advantage to cheatgrass; thus, they increase in dominance in grazed areas (Reisner et al. 2013). Livestock will also act as vectors to the spread of seed of exotic annuals such as cheatgrass and medusa head. In reality, livestock grazing increases the abundance of cheatgrass.

The synergistic effects of climate change and livestock grazing suggest irreparable harm if grazing is implemented on these allotments in 2019.

32. Climate changes have been profound over the last 25 years. For example, the 5 warmest years on record have all occurred since 2013. The climate is already changing in Oregon (Mote et al 2019). Climate changes include increases in temperature, loss of snow pack, more extreme hot days and longer fire seasons. These will affect the natural flora and fauna of the Steens Mountain. We can expect hotter drier conditions that will place additional stress on red band trout, sage grouse and the native flora. Stream flows are likely to be warmer and lower in the summer months (Mote et al. 2019). This would suggest lower productivity on the allotments yet no consideration on these effects have been implemented by the BLM. For example, the number of AUMs has not decreased on the allotments in the past decades. There is a high degree of certainty that recovery of the critical components of the shrub component following the Grandad arson fire will be further limited by climate change.

33. We also know that livestock grazing exacerbates the effects of climate change. For example, soil compaction from livestock lowers the water holding capacity of soils (Kauffman et al. 2004). As such there is less water available to plants (i.e., increased desertification). In northeastern Oregon riparian zones Kauffman et al. (2003) found that there was a decline of wetland obligate species being replaced by those adapted to drier environments under any system of livestock grazing. The loss of riparian overstory cover due to grazing on the Hardie Summer allotment (and other riparian/stream ecosystems) will expose streams to increased temperatures that will place additional stress on red band trout. In concert with climate change, the grazing on the allotments will cause irreparable harm to the flora and fauna of these allotments. Given the documented changes in climate (Mote et al. 2019) and the predicted trends in climate change, if recovery and restoration is not implemented on these

allotments within the next few years, it is likely to be impossible to recover the sagebrush and riparian systems due to the effects of climate change.

CONCLUSIONS

34. Grazing of the sites at this time is likely to cause irreparable harm for fish, wildlife and ecosystem function. In the areas within the arson fire on the Mud Creek allotment grazing will hamper the succession return to a low sage dominated ecosystem. Further, this allotment has a large crested wheat grass seeding that is not fenced from the native plant communities. A basic tenet of range management is to separate seedings of crested wheat grass which are very unpalatable compared to the native grasses. This failure to separate the seeding from the native plant communities will result in heavy utilization of the native grasses and forbs in the native communities such as area where the sage grouse lek is located, before the livestock will begin to eat the crested wheatgrass. In other words, the native vegetation and biodiversity will suffer irreparable harm through this grazing approach. All of the affected riparian areas are vulnerable to trampling and grazing damage and this will negatively affect the >80% of wildlife species that utilize riparian zones for all or part of their life histories.

35. These allotments suffer from years of heavy livestock grazing that has resulted in the degradation of resource values at landscape scales. To overcome long term grazing impact coupled with climate change effects, long term rest from grazing is needed in order to prevent irreparable harm. It will require 40–50 years to recover the Mud Creek allotment and at least 20 years of recovery is needed for the Hardie Summer allotment. In particular, allowing grazing to resume on the allotment will slow or prevent the reestablishment of low sagebrush and Wyoming big sagebrush in the uplands though trampling of the few seedlings that may be present. It will also decrease key sage grouse forage species. Grazing will affect vegetation

cover over the streams, trample stream banks and result in channel widening which would increase water temperatures, cause siltation of streams and degrade red band trout habitat. Grazing would reduce the value of riparian habitat on the allotment for all wildlife species that use riparian zone

36. Livestock grazing is the principal causal factor that has resulted in the decline of the riparian and upland ecosystems within these allotments. Suggesting that continued grazing is a viable management approach is tantamount to recommending continued smoking but at different times and intensities to a lung cancer victim.

Figure 6a. The sage grouse lek site, Mud Creek allotment (June 20, 2019). Before burning, this was a low sagebrush dominated site. The combination of overgrazing and fire has resulted in a degraded habitat unsuitable for sage grouse and the majority of other wildlife species adapted to sagebrush environments. Livestock grazing will prevent the recovery of this site. Compare with the low sage site in the following photo.

Figure 6b. Low sagebrush site that provides suitable habitat for sage grouse and other sagebrush obligate species (June 21. 2019) This is the same community type that existed at the Lek site of the Mud Ck allotment. (see photo above). To restore the low sage sites on the Mud creek allotments will require long term rest from livestock. The trampling damage and excessive utilization of native shrub seedlings, grasses and forbs will irreparably halt restoration. Failure to recover site now may limit options to the future given the effects of climate change on these environments.

Figure 7a. The crested wheatgrass seeding that characterizes the lower end of Mud Creek Allotment. (June 20, 2019). Grazing is the root cause that precipitated the degradation of the landscape. The combination of a century of overgrazing, herbicide, and seeding exotic grasses (for livestock) has completely altered the natural structure and function of this ecosystem. Seeded exotic crested wheatgrass and the annual exotic cheatgrass dominate this site. Compare to a functioning Wyoming big sagebrush site below (Figure 7b). Restoration of this site would require a combination of decades of rest from grazing and active replanting of native shrubs, grasses and forbs.

Figure 7b An ungrazed Wyoming big sage community near the Mud Creek allotment (June 19, 2019). At this site there is a diverse mix of native bunchgrasses, forbs, and shrubs. Note the bunchgrasses in intershrub spaces. This condition is resilient to fire.

Figure 8. Recovering/sprouting aspen following cessation of cattle grazing. Headwaters of Mud creek (June 21, 2019). Aspen have been reduced across the USA due to livestock grazing and they are vulnerable to the multiple effects associated with livestock grazing.

Pursuant to 28 U.S.C. § 1746, I declare under penalty of perjury that the foregoing is true and correct.

DATED this 25th day of June 2019.

s/ J. Boone Kauffman

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J. Boone Kauffman, Ph.D.

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